# Claims

[1] An apparatus for implementing a wideband multicarrier, the apparatus comprising:
a digital channelizer for pulse-shaping complex digital modulation signals, digitally mixing the signals and dividing the signals into individual signals having different center frequencies; and
a digital intermediate frequency (IF) modulation portion for modulating the divided signals into individual IF signals to generate a wideband multicarrier IF signal.

[2] An apparatus for implementing a wideband multicarrier as recited in Claim 1, the apparatus further comprising:
a clock generator for supplying a clock signal to the digital channelizer; and
a phase locked loop (PLL) for receiving the clock signal from the clock generator and supplying an N times multiplied clock signal to the digital IF modulation portion.

[3] An apparatus for implementing a wideband multicarrier as recited in Claim 1 or 2, the digital channelizer comprising:
a plurality of pulse shapers for receiving the complex digital modulation signal and separating each channel signal from adjacent channel signals;
a plurality of complex mixers for complex-modulating each of the channel signals outputted from the respective pulse shapers; and
an adder for adding I and Q signals that are complex-modulated from the plurality of complex mixers.

[4] An apparatus for implementing a wideband multicarrier as recited in Claim 1 or 2, the digital IF modulation portion comprising:
an interpolator for up-sampling the signal in order to increase a data speed and interpolation-filtering the signal in order to remove the image signals; and
an IF up-converter for modulating the signal outputted from the interpolator into an IF signal.

[5] An apparatus for implementing a wideband multicarrier as recited in Claim 4, the interpolator comprising:
an I signal up-sampler for receiving the I signal from the digital channelizer and inserting 0 between the signals in order to increase a data speed;
an I signal interpolation filter for filtering image signals from the signals inputted

from the I signal up-sampler;

an Q signal up-sampler for receiving the Q signal from the digital channelizer and inserting 0 between the signals in order to increase a data speed; and

an Q signal interpolation filter for filtering image signals from the signals inputted from the Q signal up-sampler.

[6] An apparatus for implementing a wideband multicarrier as recited in Claim 4, the IF up-converter comprising:

a numerically controlled oscillator (NCO) for generating sine and cosine waves;

a multiplier for multiplying I and Q signals inputted from the interpolator by the sine and cosine waves inputted from the NCO; and

an adder for adding the signals from the multipliers and generating a wideband multicarrier IF signal that is comprised with a plurality of narrowband IF signals whose carrier frequencies are different from each other.

[7] An apparatus for implementing a wideband multicarrier as recited in Claim 3, wherein the clock generator provides the clock signal to the plurality of complex mixers in the digital channelizer.

[8] An apparatus for implementing a wideband multicarrier as recited in Claim 6, wherein the PLL receives the clock signal from the clock generator and supplies the clock signal to the NCO that controls the frequency of the IF up-converter in the digital IF modulation portion.

[9] An method for implementing a wideband multicarrier, the method comprising the steps of:

pulse-shaping complex digital modulation signals;

digitally mixing the signals;

dividing the signals into individual signals having different center frequencies;

interpolating the divided signals;

quadrature-mixing the signals; and

modulating the signals into digital IF signals.